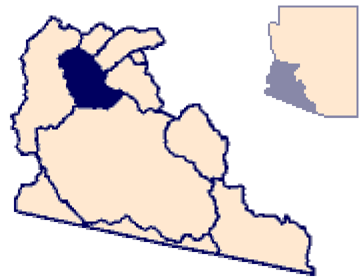
RANEGRAS PLAIN BASIN



The Ranegras Plain basin is in western Arizona and contains about 912 square miles (Figure 15). The basin is a typical example of the Basin and Range physiographic province, which is characterized by broad alluvial valleys separated by mountain ranges. The Ranegras Plain basin is a northwest-trending plain surrounded by low block-faulted mountains. The basin is bounded on the north by the Bouse Hills, on the east by the Little Harquahala and Granite Wash Mountains, on the south by the Eagletail and Little Horn Mountains, and on the west by the Plomosa and New Water Mountains.

The plain slopes to the northwest and is drained by Bouse Wash, an ephemeral stream that exits the basin near the Town of Bouse. The Bouse Wash drainage area is tributary to the Colorado River and includes Butler Valley, Ranegras Plain, and the the western section of McMullen Valley. Elevations on the Plain range from about 1,300 feet above mean sea level at its southern end to about 930 feet above mean sea level near the Town of Bouse. The surrounding mountains have elevations of up to 3,500 feet above mean sea level.

Groundwater in the Ranegras Plain basin occurs primarily in the basin-fill deposits. Wells developed in the basin-fill yield as much as a few thousand gallons per minute (Wilkins and Webb, 1976). Water resources in the consolidated sedimentary rocks have not been widely developed. The few wells drilled in the mountainous areas yield 0-10 gallons per minute (Wilkins and Webb, 1976).

Groundwater is the only dependable source of water in the Ranegras Plain basin, and almost all groundwater pumped in the basin is used for agricultural irrigation. Groundwater development began in 1948 when two irrigation wells were drilled (Briggs, 1969). By 1957, 5,200 acres of land were being irrigated by 15 wells (Briggs, 1969). The amount of land under irrigation and the amount of groundwater being pumped has varied. Groundwater pumpage and the amount of land under cultivation peaked in 1981 when 50,000 acre-feet of water were pumped to irrigate 12,600 acres (Johnson, 1990). In 1988, 7,300 acres were irrigated with 28,000 acre-feet of water (Johnson, 1990). Since 1988, much of that land has been retired.

Water levels in the basin range from 28 feet below land surface to 455 feet below land surface (Johnson, 1990). Water levels are shallowest in the northwestern parts of the basin near the Town of Bouse, and deepest in the eastern parts of the basin along the mountain fronts. Groundwater flows through the basin from the southeast to the northwest and exits the basin near the Town of Bouse.

Water levels have changed markedly in the basin since widescale irrigation began in the 1950's. From 1950 to 1988, approximately 657,000 acre-feet of groundwater were pumped from the basin for agricultural purposes. Since 1975, water level changes of a rise of 1 foot to a decline of more than 40 feet have been recorded (Johnson, 1990). Rising water levels probably reflect areas where groundwater pumpage has ceased. Likewise, declining water levels are occurring where irrigation pumpage has begun or is continuing. Extensive groundwater pumpage has created a large cone of depression in the eastern part of the basin near Pyramid Peak (Johnson, 1990). Withdrawals began in this area in the early 1980's but have decreased since 1988 (Johnson, 1990). Several areas of perched groundwater also exist in the basin. Water levels in these areas are 10 to 60 feet higher than the surrounding areas (Johnson, 1990). More perched areas may exist, but more data need to be collected to delineate these areas.

Well yields in the basin range from 85 gallons per minute to 3, 310 gallons per minute (Johnson, 1990). The Arizona Department of Water Resources (1988) has estimated that there are 21.7 million acre-feet of water available to a depth of 1,200 feet below land surface.

Metzger (1957) estimated recharge to the basin at 5,000 acre-feet per year. Most water is recharged into the aquifer by infiltration of runoff in Bouse Wash and its tributaries. The little rain that does fall on the valley floor is quickly lost to evapo-transpiration. Subsurface inflow of groundwater from Butler Valley and the Harquahala Plains INA likely contribute less than 500 acre-feet of recharge per year each (Johnson, 1990). A new source of recharge to the basin is the Central Arizona Project canal which crosses the northeast part of the basin. The Central Arizona Water Conservation District has developed seepage rates to estimate water loss from their canals. Based on these rates approximately 2,000 - 3,000 acre-feet of water could be recharged into the Ranegras Plain aquifer annually from the Central Arizona Project canal.

The chemical quality of water in the Ranegras Plain basin is of poor quality. Total dissolved solids concentrations were estimated from specific conductance values for 48 wells between 1984 and 1989. Of these, only five wells had total dissolved solids (TDS) levels below the secondary maximum contaminant level of 500 milligrams per liter (mg/l) recommended by the U.S. Environmental Protection Agency (Johnson, 1990). Total dissolved solid values range from a low of 293 mg/l to a high of 3,660 mg/l (Johnson, 1990). Wells in the north-central part of the basin have the highest TDS concentrations.

Fluoride concentrations in the sampled wells ranged from 0.1 to 21.0 mg/l. Thirty seven of the 48 sampled wells exceeded the maximum contaminant level for fluoride of 4.0 mg/l (Johnson, 1990). Detailed chemical analysis of 39 sampled wells revealed unusually high concentrations of two inorganic substances that may present a health risk to humans. The two inorganic compounds, hexavalent chromium and selenium, can be toxic in high concentrations. Thirteen of the 39 sampled wells exceeded the maximum contaminant level of 0.05 mg/l for hexavalent chromium. Hargis and Associates (1988) found four wells in the basin with selenium concentrations exceeding the 0.01 mg/l maximum contaminant level. While both substances occurred over a large area, they are not basin-wide and may or may not be vertically isolated.